

SPECIFICATION

TITLE

"SWITCHED CONNECTION SYSTEM WITH ACCESS TO ITS OWN
RESOURCES VIA THE INTERNET"

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BACKGROUND OF THE INVENTION

Field of the Invention

The invention relates to a switched connection system with access to its own resources via the Internet.

10 Description of the Related Art

The exponential growth of the Internet and the increasing trend to use it, clearly indicates that the Internet will become the overall network of smaller networks. The other worldwide network, namely the public
15 telephone network PSTN (Public Switched Telephone Network), and the Internet are becoming closely inter-related and each can benefit from the other. In particular, the Internet can benefit from the PSTN network because of extensive intelligence and resources in the PSTN network.
20 The Internet has been slow in making full use of the extensive intelligence in the switching nodes because the interface between the PSTN and the Internet is not clearly defined. Even after a clear interface has been defined, the cost in the switching nodes is too high to be justified
25 because the costs to implement a feature in a switching node are very much higher than in a PC (personal computer). The problem is how to bring together the two technologies and provide Internet features with access to the

intelligence and the resources of the PSTN network at a minimum cost.

At the present, it is very difficult to use the resources of a switching node for Internet services.

5 Examples of these resources include call control, switching, administration of basic data (database), hardware information, etc. One approach to arriving at a solution is based on developing new application programs and new interfaces in the switching nodes which provide
10 external applications with access to the resources in the PSTN switching node. This is technically possible, but the associated financial cost is very high.

WO 97/22209 discloses an intelligent network which is connected to the Internet via its service control point. In
15 this system, the resources for services are stored on a server which can be accessed via the Internet, providing worldwide access.

SUMMARY OF THE INVENTION

20 The invention is based on the object of providing a system which permits Internet applications to access resources of the switching node. A further object of the present invention is to utilize the Internet to use the resources in the PSTN switching nodes at minimum cost, and
25 to implement a number of Internet features which are not yet available occupied with the Internet which are not yet available. A further object of the application is to indicate how the high expenditure which has previously been necessary to enable the Internet to access resources in the
30 switching node can be drastically reduced.

This objects is achieved by an arrangement for connecting a switched connection network to the Internet, comprising a switching node, and an operator console which is connected to the switching node via an interface, the
5 Internet being connected to the switching node via the operator console and the interface.

This object is also achieved by an operator console for connecting a switched connection network to the Internet, comprising operator functions which are designed
10 so that they can be activated via a connection to the Internet.

This object is also achieved by a method for accessing resources in a switching node of a switched connection system via the Internet, comprising the steps of connecting
15 an operator console to the switching node, connecting the operator console to the Internet, providing an application programming interface, and accessing an Internet-related application via the application programming interface which is provided for an operator application to access a
20 resource of the switching node.

The invention provides the Internet with access to the existing resources and to the intelligence in the switched connection network PSTN. Operator functions which are in any case already present can largely be utilized in the
25 implementation and the additional cost is low. The present invention forms the basis for features which require interaction between the switched connection network PSTN and the Internet network.

Further advantageous developments of the invention
30 include having operator functions in the operator console that can be activated via a connection to the Internet, as

well as implementing the operator console on a Microsoft Window NT™ based platform. The operator console may utilize a conventional interface for connecting to a switching node and have a port for connecting to the internet. Operator functions of the console can be automatically executed by an application within the operator console. And finally, the operator console may have an application that acts as a proxy agent between the switched connection and the Internet.

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BRIEF DESCRIPTION OF THE DRAWINGS

The subject matter of the application is explained in more detail below as an exemplary embodiment to a degree which is necessary for comprehension, and with reference to figures.

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Fig. 1 is a schematic diagram showing a basic illustration of the inventive interconnection of a PSTN with the Internet,

5 Fig. 2 is a schematic diagram showing a basic illustration of an inventive structure in which a switching device is connected to a network control platform, and

Fig. 3 is a schematic diagram showing a basic illustration of a conventional structure of a
10 switched connection network

In the figures, identical elements are designated by identical references.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

15 Fig. 3 shows a conventional switching device SW (switch) to which a subscriber terminating device TE-A is connected via a two-wire connecting line a/b, and to which a subscriber terminating device TE-B which is controlled via an ISDN BA from an operator console OSS
20 (Operator Service System) is connected. The interface may be of the type ISDN BA (Integrated Services Digital Network Basic Access) Level 3. The subscriber terminating devices are illustrated by way of example for all known subscriber terminating devices. Programs for applications
25 are installed in the operator console by the operator OA (Operator Application).

Fig. 2 shows, on the left-hand side, a basic illustration of a switching node SW which has a structural design SW_HW (Switch Hardware), functions MW
30 (Middleware) and application programs AP1 (Application). On the right-hand side in Fig. 2 shows a basic illustration of an operator console OSS which has a

structural design PC_HW (Personal Computer Hardware), an interface SW-API (switch application programming interface) and application programs AP2 (Application). According to the application, the operator console is
5 expanded with applications 3P_AP_PLT (third party application platform). The switching node has an interactive connection to the operator console via a network NW. The application programs AP1 have an interactive connection to the application programs AP2,
10 RPCr&r (Remote Procedure Call Requests and Responses).

The software has functions MW (Middleware) and interfaces APIs (Application Programming Interface) for accessing these functions. The invention develops applications from third parties in external platforms and
15 utilizes the middleware in switching nodes in order to implement intelligent functions. The applications use predefined APIs in order to obtain access to the middleware. In one preferred embodiment, access to the network services is possible only via these APIs.
20 Normally, the middleware necessary for new applications requires, for its implementation, extremely high expenditure in the switching nodes because all of the functions and interfaces would have to be implemented. The invention is based on the fact that, to a large
25 extent, operator functions, which are already present, can be used to implement the invention with low additional cost.

Presently, almost all switching nodes, including those of the switched connection system EWSD
30 (Elektronisches Wahlsystem digital, manufacturer-specific) have the functionality of an operator console. In the case of EWSD, the console is in the form of a PC (Personal Computer) which is connected to the switching node via an interface BA-ISDN (Basic Access-Integrated

Services Digital Network) which is also referred to as Basic Rate Interface by experts. The operator console OSS which is connected to the switching node provides different functions described below. The list discloses
5 a wide range of features which are conventionally not available to one subscriber.

Operator feature requirements

- Call requesters. A calling subscriber can request the services of the operator by selecting the LAC/DN
10 (Local Area Code/Directory Number) of the operator.
- Qsi (Quasi) automatic call permits subscribers of a local exchange to set up wide-area traffic connections by dialing the DN (Directory Number) for the service and the number of the B subscriber
15 (subscriber to be called) themselves, although the call is directed to an operator for an operator service and an A subscriber connection number, identification and checking.
- Transfer to the operator. This involves the
20 transfer of the call to the operator in cases where the operator's help is needed, for example, in the case of an ANI (Automatic Number Identification) error.

Call acceptance/call presentation

- 25 - Manual acceptance. This involves operator measures necessary to accept the call from the switch node.
- Automatic acceptance. This involves operator measures that are not necessary to accept the call from the switching node.
- 30 - Automatic greeting. After a call has been connected to an operator, this feature permits the operator to send the greetings formula to the calling subscriber

from an INDAS (Individual Digital Announcement Machine) record, instead of being forced to literally repeat the standard formula for each call.

Call forwarding. Call forwarding refers to the diverting
5 of a call by the operator to another subscriber.

- Requested call forwarding. Requested call forwarding refers to the extension of a call by the operator while the calling A subscriber remains connected to the operator.

10 - Delayed call forwarding.

Delayed call handling: This feature permits the operator to delay the handling and placing of calls to a later time, for example, at the request of the subscriber. DCH (Delayed Call Handling) provides the following

15 possibilities:

- registration of a call; - searching for a registered call;
- changing details of the registration; and
- carrying out the call at the time provided or, if
20 necessary, call forwarding devices, available.

Forwarding a call: The call holding feature permits an operator who is occupied with an existing call to remain connected to the call while handling another call. If the operator holds a set-up A subscriber to the operator
25 for a B subscriber call, the system puts the call into the holding state, i.e., both the A subscriber and the B subscriber remain connected to their actuated speech path and only the operator is removed from the call.

Call handling devices

- 30 - Notification of the duration of a call. If requested by a subscriber who is involved in the call, the

operator can mark a call for notification. This can be a verbal operator notification or notification via a special signal tone.

- Automatic call duration limitation (ACDL). If
5 requested by a subscriber who is participating in a call, the operator can mark the call for ACDL and enter the duration. The system supplies a signal tone a short time in advance which is specified by the administration, in order to warn both parties
10 that their requested time interval, has expired. At the end of the requested time interval the system ends the call.
- Simulated response. If the response signal is not received from the B end of the call although the B
15 subscriber is already connected, the operator can simulate the response signal by manual measures.
- Toll metering. The operator can update AMA
(Automatic Message Accounting) cards and initiate and/or terminate the toll metering period for
20 activated calls. Call tolls can be charged to the toll account of a third party.
- Local access to the database. The operator has access to the local database.
- Call partition. The partition function permits the
25 operator to interrupt the communication with a specific subscriber of the activated call (to interrupt either the A subscriber or the B subscriber). The activated call in this case may be a three-way conversation. In this case, the three-
30 way conversation is partitioned, the specific subscriber is placed in the holding function and the other subscriber remains in an activated connection to the operator.

- Checking functions: There are various checking possibilities, including checking the call number of the A subscriber, checking the number of the call toll account (when the call tolls are charged to a third party), and checking the busy state. Also, offering in a connecting line enables the operator to offer the call to a busy subscriber.
- Repeated attempt in a busy state. The operator can make additional attempts at switching, allowing for a busy state of a trunked channel, by releasing the connection and setting up the connection again.

Graphic display/representation of traffic and performance statistics and reports can be provided, as well as different performance reports.

- According to the invention, access to the switching node and the network resources is provided for a subscriber device.

Fig. 1 shows an Internet user IU who has set up a connection to his Internet provider ISP POP via the switching node SW in accordance with the Internet Protocol IP. The Internet provider has a connection to the Internet GI (Global Internet). The operator console NCP, which is extended with additional applications AA, has a direct connection to the Internet. A service agent SA is connected to the switching node via a two-wire line a/b.

The idea on which the invention is based relies on the use of the existing interface between the OSS and the switching node in order to connect the switched connection network PSTN and the Internet. In particular, the software implemented in the switching node is used for the OSS as middleware, and the third-party applications which are arranged on external platforms are

provided with the possibility of accessing this
middleware. This makes it possible for the Internet to
use the resources and the intelligence in the PSTN
network and permits it to develop features which require
5 interaction between the PSTN and the Internet network.

Access is also provided to the middleware in the
switching node.

The invention is also based on the idea of
transferring (porting) the OSS software to a Windows NT
10 platform, and of adding applications which carry out the
conventional operator functions automatically. In
addition, new applications can be added which function as
a proxy agent between the Internet and the PSTN network.
The connection between the operator console as a proxy
15 and the Internet could have, for example, a transmission
rate of 64 kbit/s. A conventional operator console OSS
which is extended with the features according to the
application is referred to as a NCP (Network Control
Platform). The essential functions of an OSS platform
20 which a NCP platform uses are:

- call forwarding;
- offering a connecting line for an active subscriber;
- operating the connection billing information;
- repetition in the event of a line being busy; and
- 25 - delayed call diversion.

The NCP uses the existing basic access interface to
the switching node and has a TCP/IP(Transmission
Control Protocol/Internet Protocol, which is a
communications protocol defined by the US Defense
30 Department for connections and exchanging data in
different computer networks) connection to the
Internet. The additional expenditure on the

switching node in this invention is low because almost all of the functions required have already been implemented. A third party application can be communicated by using predefined APIs and providing access to all of the resources in the switching node.

The application of the present invention to the features described above permits use of Internet features which have previously only been possible at a high cost. Examples of such features are given below.

A first embodiment permits switching between an Internet session and acceptance of an incoming call connection. If an incoming call arrives while a subscriber is surfing the Internet, the subscriber receives a pop-up message on his Internet navigation system (on his screen interface to the Internet, i.e., his browser) in order to inform him about the call and to provide him with the possibility of interrupting the Internet session and accepting the incoming call. The pop-up contains/is composed of the subscriber number of the calling subscriber. The feature may be assumed to function as follows.

The Network Control Platform NCP has the following applications:

- Information recording application: records that the subscriber is occupied with the Internet and stores the IP (Internet Protocol) address and the E164 address of the user.
- PSTN proxy call application: acts as a proxy agent between the Internet subscriber and the

PSTN network in order to carry out the call-related functions.

- 5 - The Internet subscriber dials the number which sets up a connection to his ISP POP (Internet Service Provider Point of Presence) as normal
- 10 - The Internet user sets up a TCP/IP connection of low bandwidth to the NCP: Information recording application via the ISP POP and informs the NCP that it is occupied with the Internet and makes its own IP and E 124 available. This NCP connection is maintained and is used to communicate with the Internet user for an exchange of data;
- 15 - The user surfs WWW (World Wide Web) pages as normal;
- 15 - An external subscriber attempts to call the Internet user. The switching device (Switch) determines, by comparing the number of the called subscriber with the ISP (Internet Service Provider) numbers, that the subscriber is occupied with the Internet and directs the external subscriber to the NCP PSTN proxy call application.
- 20 - The NCP PSTN proxy call application supplies the external subscriber with a message indicating that attempts are being made to direct the call to a subscriber who is occupied with the Internet and that the process may take longer than normal.
- 25 - The purpose of this is to ensure that the external subscriber does not abort the call attempt because the subscriber assumes that no-one is accepting the call;
- 30 - The NCP PSTN proxy call application produces an IP packet and sends it to the subscriber over the Internet. The transmitted IP packet contains the

number of the calling subscriber. A connection to the Internet Navigation System (Browser) of the called subscriber triggers a menu pop-up and indicates the number of the calling subscriber and provides the subscriber with a button enabling him to accept the call or refuse it;

5
- If the subscriber presses the button in order to accept the call, this information is transmitted to the NCP. The NCP PSTN proxy call application will reconfigure the call and subsequently releases the Internet user from the ISP POP and brings about a connection, via the interface ISDN-BA, between the external subscriber and the Internet user. As soon as the modem is released, the telephone at the Internet user end rings and a normal call is set up if the user accepts the call;

10
- The NCP withdraws completely from the call, i.e., there is no longer connection signaling or a bearer connection to the Internet user. If the subscriber wishes to set up a connection to the Internet again he must start from the beginning.

15
A second embodiment is provided by an advanced message writing display. The subscriber can output an interrogation so that he is informed if an E-mail (letter dispatched in electronic data format) is received from a specific sender or in relation to a specific matter. The subscriber can be informed via a specific tone when the telephone call is accepted or rung with a message which indicates that an E-mail is waiting, or, if the personal computer is set up in such a way as to start the subscriber E-mail program, then to download the E-mail. The subscriber may receive the information anywhere, for example, on a business trip. The feature functions as follows.

The NCP has the following applications:

- 5 • PSTN proxy call application: This application acts as a proxy agent between the Internet user and the PSTN network in order to carry out the call-related functions.
- 10 • E-mail signaling application: At the subscriber's request, this application monitors the E-mail of the subscriber and can trigger additional applications in the NCP if this application finds E-mail from a particular subscriber or with a particular content.
- 15 - The subscriber outputs an interrogation via the Internet to the NCP E-mail signaling application, in order to inform the application if an E-mail is received from a particular subscriber or with a particular content. The subscriber can also The NCP E-mail signaling application monitors the E-mail of the subscriber. If an E-mail with a particular distinguishing feature is received, the NCP: PSTN proxy call application is activated.
- 20 - The NCP PSTN proxy call application informs the switching node (Switch) via the ISDN-BA interface, so that this node supplies a specific tone to the subscriber if he accepts the call, or the NCP PSTN proxy call application can inform the subscriber that an E-mail is waiting. It is also possible to transmit a message to a pager (a mobile receiver which displays
- 25 - alphanumeric characters received by radio) which indicates that an E-mail is waiting, or even to send the E-mail to the pager or to a mobile communications device, for example, a mobile
- 30

phone determine how often the E-mail is
interrogated.

A third embodiment is provided by switching between the
use of an Internet navigation program (browsing WWW
5 Pages) and speaking with a real operator who is not
connected to the Internet. If a user is surfing on the
Internet, he can click on an HTML (Hypertext Markup
Language) entry "speak with operator". This causes the
Internet session to be interrupted and the subscriber to
10 be connected to a service agent SA via the ISP POP, the
Internet GI, the NCP, the interface ISDN-BA and the
switching node. In the event of the service agent being
busy, it is possible for the NCP to be informed via the
interface ISDN-BA if the service agent is free. Here, the
15 connection to the Internet is interrupted only if the
service agent is available.

A fourth embodiment is provided by interrogating
personal messages from the call answering service via the
Internet. A subscriber who is, for example, on holiday or
20 on a business trip can interrogate messages from his call
answering machine at home via the Internet. The messages
may be transmitted as an audio signal stream via the
Internet. The voice quality is satisfactory in this
arrangement since this process does not need to take
25 place in a real-time mode.

The above-described invention is illustrative of the
principles of the present invention. Numerous
modifications and adaptations thereof will be readily
apparent to those skilled in this art without departing
30 from the spirit and scope of the present invention.